The Science of Drought

Los Alamos is applying its world-class computer modeling capabilities and years of climate research to a problem close to home: understanding drought and the hydrology of the arid Southwest. The mission of the National Science Foundation Science and Technology Center for Sustainability of semi-Arid Hydrology and Riparian Areas, or SAHRA, is to promote sustainable management of water resources in semi-arid regions. The University of Arizona, with the top-rated hydrology program in the world, leads the effort with University of California campuses Berkeley, Davis, Riverside, Los Angeles and Scripps, along with the University of New Mexico, and New Mexico Tech.

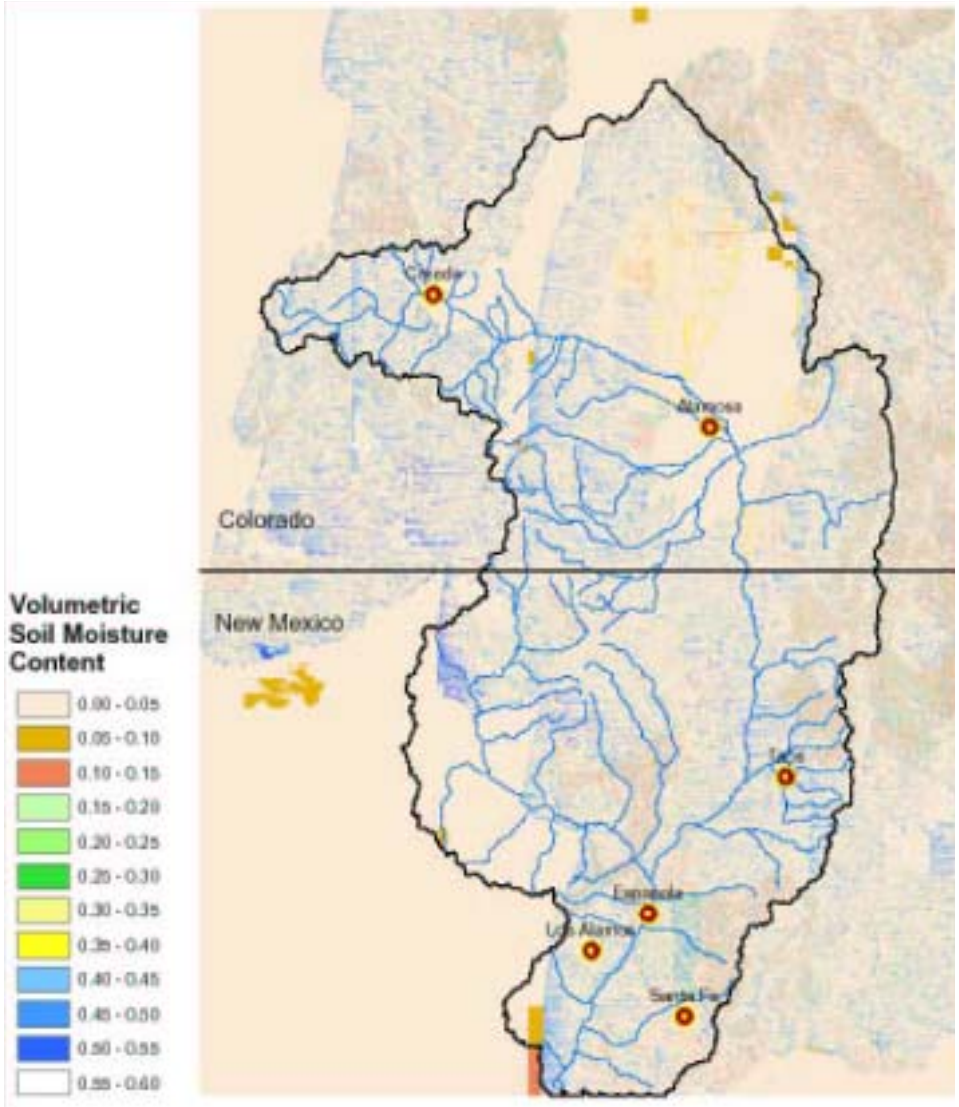
Los Alamos has created the Los Alamos Distributed Hydrologic System, or LADHS, which is an integrated, high-resolution model to analyze and predict the effects of climate variability and land use change on the water balance in the Rio Grande Basin.

This model integrates computer codes that simulate atmosphere, surface, and groundwater components in space and over time, and provides valuable clues about the functioning of the hydrologic system of the Rio Grande.

The partnership has developed a workable approach to stream aquifer interactions and methods of modeling flow through random porous media. Next they will integrate their coupled atmospheric and land surface model of the Rio Grande with a coupled subsurface model and develop scaling relationships between parallel computer architectures and the structure of the basin. They plan to test their models with field data and information generated by other, more mature hydrology models.

The close collaboration among the diverse SAHRA partners ensures the high quality of the research and provides the Laboratory with an opportunity to address critical water resource problems in the southwestern United States, while demonstrating that Los Alamos can solve such problems. Working with prestigious universities also benefits Los Alamos recruiting efforts.

Los Alamos' model joins the physics of the Rio Grande basin with one major interface that has not been exploited in previous models: regional socio-economics. Although challenging, socio-economic elements are essential in any model that hopes to support social and political decisions for water allocation under different climate or water consumption scenarios. Without it, policymakers fail to see the strong personal and politically sensitive reasons for studying and protecting the hydrology of semi-arid riparian areas. The project also will provide a strong science base for the New Mexico Water for Energy Initiative, a program of analysis of water and energy policy and its impacts on the State and region; new technology to improve the water budget of power plants and watersheds; and public outreach and education, with a goal of clean, affordable and sustainable water and energy.



Soil moisture distribution at 100-meter spatial resolution for the upper Rio Grande Basin, the first time this resolution has been achieved.

Los Alamos National Laboratory is operated by the University of California for the U.S. Department of Energy's National Nuclear Security Administration

Publis Affairs Office 505-667-7000
www.lanl.gov

9/03